

STANDARD FORM NO. 64

17-20-

# Office Memorandum • UNITED STATES GOVERNMENT

TO : Chief, External Projects Section

DATE: 31 December 1953

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FROM : Chief, R & D Laboratory

SUBJECT: RR-6 H.F.O. Frequency Pulling and H.F.O. Radiation

1. Enclosed are the results of tests conducted at the Laboratory on RR-6 H.F.O. pulling versus gain control settings and RR-6 H.F.O. radiation. Some comparative measurements with the SSR5B and RR-2 receivers were also made.

2. It is concluded that there is a direct correlation between RR-6 H.F.O. frequency pulling and H.F.O. radiation. It seems imperative that all RR-6 units on hand be inspected to insure that the oscillator lead referred to in the reports is removed from the RF compartment. Unless this is done, the excessive oscillator radiation could result in rather serious consequences.

3. It is understood that the contractor has been appropriately notified of this situation.

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2 Attachments

Notes on the RR-6 Receiver Oscillator Pulling  
RR-6 Oscillator Radiation Tests

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- (b) It is recommended that the Navy Inspector be requested to correlate the oscillator radiation production test equipment against the contractor's production prototype.
- (c) All sets in our possession which show a pull of 10 kc or more should have the oscillator lead dressed out of the RF compartment. The question whether or not further reduction in couplings on the sets now in our possession is necessary may be best answered by the results of oscillator radiation measurements against the production prototypes.



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## RR-6 OSCILLATOR RADIATION TESTS

Since the RR-6 oscillator pulling investigation was conducted (17 and 18 December), measurements have been made of the RR-6 oscillator radiation as a function of pulling, i.e., the amount of oscillator injection voltage found on the RF grid.

The Stoddart field intensity measuring equipment was set up according to JAN-I-225. The equipment was placed 1' from the loop antenna, and a 27' length of wire was looped twice across a 9' screened room to act as a radiator for oscillator voltage on the RF grid.

The following data was taken on an early RR-6, #2003:

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>	<u>NOTES</u>
1.3 kc	4.5 k uv/m	27'	
1.3 kc	1.6 k uv/m	None	Case Radiation

Unit 5346, which was sent to us by the Test and Evaluation Section, was measured by the Analysis and Appraisal Section as being shifted 31 kc at 15 mcs by a change in gain control of from maximum to minimum. This unit was tested under the identical conditions as for the unit #2003 and the following results obtained:

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>	<u>NOTES</u>
1.5-2 kc	4. k uv/m	27'	
1.5-2 kc	2.6 k uv/m	None	
5 kc	2.6 k uv/m	None	
5 kc	11.5 k uv	27'	OSC lead near RF coils
16.5 kc	1.7 k uv/m	None	Near RF coils
16.5 kc	15. k uv/m	27'	

Unit 5404 sent us by T&E was measured as shifting 10 kc; and after decoupling was applied, the following measurements were recorded:

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>
1.5 kc	2.4 uv/m	None
1.5 kc	3.5 uv/m	27'

Unit 5369 sent us by T&E which was measured as shifting 25 kc was measured for oscillator radiation characteristics and found to be the following:

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>
1.2 kc	2.5 k uv/m	None
1.2 kc	4.6 k uv/m	27'

Unit 2758, whose initial shift was not recorded, was brought down to a shift of 1.5 kc. This unit has the early crystal socket.

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>
1.5 kc	2.2 k uv/m	None
1.5 kc	4.1 k uv/m	27'

A unit which had not been opened was obtained from the warehouse. The unit number is 5512. The following measurements were made:

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>	<u>NOTES</u>
12-15 kc	3.2 k uv/m	None	Unchanged
12-15 kc	47 k uv/m	27'	Unchanged
1.5 kc	4 k uv/m	None	OSC lead out of RF compartment
1.5 kc	4.2 k uv/m	27'	OSC lead out of RF compartment
1.5 kc	3.5 k uv/m	None	OSC lead dressed in OSC compartment
1.5 kc	4.2 k uv/m	27'	OSC lead dressed in OSC compartment

Using the same set-up, an SSR5-B receiver, #1984, was measured.

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>	<u>NOTES</u>
500 cy	1.3 k uv/m	None	12.5 mcs
	20 k uv/m	27'	12.5 mcs
	1 k uv/m	None	6.0 mcs
	1.3 k uv/m	27'	6.0 mcs

An RR-2 receiver, #3566 was measured for oscillator radiation.

<u>SHIFT</u>	<u>RADIATION</u>	<u>ANT</u>	<u>NOTES</u>
6.5 kc	11.0 k uv/m	None	24 mcs
6.5 kc	11.0 k uv/m	27'	24 mcs
2. kc	7.5 k uv/m	27'	12 mcs
2. kc	4.4 k uv/m	None	12 mcs

The BFO radiations were made and the RR-2 radiation found the worse.

These tests are comparative. Field tests should be made on this equipment for more realistic comparison, as JAN-I-225 does not apply to high frequency oscillator radiations, particularly.

### CONCLUSIONS

The oscillator tank lead running through the RF compartment must be removed on all units and redressed in the oscillator compartment. On those few units which are initially pulled over 20 kc, the action indicated under paragraphs b and c, page 2 of the 18 December report on this subject, can be applied profitably. The test for improvement is the action of the RF injection voltage as a function of RF gain control.



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